August 31, 2010

Dr. Timothy H. Trumbull, Director
Reactor Critical Facility
NES Building 1-10
Rensselaer Polytechnic Institute
110 8th Street
Troy, NY 12180-3590

SUBJECT: RENSSELAER POLYTECHNIC INSTITUTE - NRC INSPECTION REPORT NO. 50-225/2010-201

Dear Dr. Trumbull

The U.S. Nuclear Regulatory Commission (NRC) conducted an inspection on August 2-5, 2010, at your Reactor Critical Facility (Inspection Report No. 50-225/2010-201). The inspection included a review of activities authorized for your facility. The enclosed report presents the results of that inspection. Areas examined during the inspection are identified in the enclosed report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations of activities in progress. Based on the results of this inspection, no safety concern or noncompliance of requirements was identified. No response to this letter is required.

In accordance with Title 10 of the *Code of Federal Regulations,* Section 2.390 "Public inspections, exemptions, and requests for withholding" a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's document system (Agencywide Document Access and Management System (ADAMS)). ADAMS is accessible from the NRC Web site at (the Public Electronic Reading Room) http://www.nrc.gov/reading-rm/adams.html.

Should you have any questions concerning this inspection, please contact Jack Donohue at 860-495-5332 or electronic mail at Jack.Donohue@nrc.gov.

Sincerely,

/RA/
Johnny H. Eads, Jr., Chief
Research and Test Reactors Oversight Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Docket No. 50-225

License No. CX-22

Enclosure: As stated

cc w/encl: See next page

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DATE	8/13/2010	8/19/2010	8/31/2010

OFFICIAL RECORD COPY

cc:

Mayor of the City of Schenectady
Schenectady, NY 12305

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Test, Research, and Training
Reactor Newsletter
University of Florida
202 Nuclear Sciences Center
Gainesville, FL 32611

U. S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION

Docket No:	50-225
License No:	CX-22
Report No:	50-225/2010-201
Licensee:	Rensselaer Polytechnic Institute
Facility:	Reactor Critical Facility
Location:	Schenectady, NY
Dates:	August 2-5, 2010
Inspector:	Jack Donohue
Approved by:	Johnny H. Eads, Jr., Chief Research and Test Reactors Oversight Branch Division of Policy and Rulemaking Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

Rensselaer Polytechnic Institute
Reactor Critical Facility
NRC Inspection Report No. 50-225/2010-201

The primary focus of this routine announced, operation inspection was the on-site review of selected aspects of the Rensselaer Polytechnic Institute's (the licensee's) research reactor safety program. This included a review of: organization and staffing, committee, audits and reviews, health physics, emergency planning and transportation. The licensee's programs were acceptably directed toward the protection of public health and safety, and in compliance with the U. S. Nuclear Regulatory Commission (NRC) requirements.

Organization and Staffing

- The organization and staffing were consistent with Technical Specification (TS) requirements.

Committee Audit and Reviews

- Review and oversight functions required by the TS were acceptably completed by the Nuclear Safety Review Board.

Radiation Protection Program

- Surveys were being completed and documented acceptably to permit evaluation of the radiation hazards present.
- Postings met the regulatory requirements specified in Title 10 of the *Code of Federal Regulations* Parts 19 and 20.
- Personnel dosimetry was being worn as required and doses were well within the licensee's procedural action levels and NRC's regulatory limits.
- Radiation monitoring equipment was being maintained and calibrated as required.
- The Radiation Protection Program being implemented by the licensee satisfied regulatory requirements.
- Effluent monitoring satisfied license and regulatory requirements and releases were within the specified regulatory and TS limits.

Emergency Preparedness

- The emergency preparedness program was conducted in accordance with the requirements stipulated in the Emergency Plan.

Transportation of Radioactive Materials

- No radioactive material was transferred from or to the reactor since the last inspection.

REPORT DETAILS

Summary of Facility Status

The Rensselaer Polytechnic Institute (RPI, the licensee) Reactor Critical Facility (RCF) Class II research reactor, licensed to operate at a maximum steady-state thermal power of 100 Watts, continued to be operated in support of academic instruction, operator training, surveillance, and research. During the inspection the reactor was operated in support of training.

1. Organization and Staffing

a. Inspection Scope (Inspection Procedure (IP) 69001-02.01)

The inspector reviewed the following regarding the licensee's organization and staffing to ensure that the requirements of Section 6.1 of the Technical Specifications (TS), Amendment No. 11 to License No. CX-22 dated September 7, 2004, were being met:

- Organizational structure
- Staffing requirements for safe operation of the reactor critical facility
- Annual Report for the RPI-RCF for the Year 2009, dated February 19, 2010
- Standard Operating Procedures
- RCF Logbook entries from August 30, 2008, to present

b. Observations and Findings

Through discussions with licensee representatives, the inspector determined that that the Chairman of the Nuclear Safety and Review Board (NSRB) had recently resigned and there was no apparent designated replacement. The inspector requested the Facility Director provide a time frame for an acting Chairman or Chairman to be appointed. The TS required an appointment by the Dean of Engineering. The Dean of Engineering then appointed Dr. Yaron Danon as Chair of Rensselaer NSRB effective July 2010.

The RCF staff consisted of three part-time RPI employees, each holding an NRC Senior Reactor Operator (SRO) license, and three additional SROs; two being current RPI graduate students and the third being a recent RPI graduate working at the Knolls Atomic Power Laboratory but volunteering services and maintaining an SRO license.

The RCF Director, T. Trumbull reports to the Head of the Mechanical, Aerospace and Nuclear Engineering (MANE) Department. Reporting to the RCF Director were and Operations Supervisor J. Thompson. The MANE Department Head, T. Wei reports to D. Rosowsky, Dean of Engineering.

Through review of the reactor logbook the inspector verified that the individuals staffing for the reactor were clearly designated and met the TS requirements.

c. Conclusion

The licensee's organization and staffing were in compliance with the requirements specified in the TS.

2. Committees, Audits, and Reviews

a. Inspection Scope (IP 69001)

The inspector reviewed the following to ensure that the audits and reviews stipulated in TS Section 6.1.5 and Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.59 were being completed by the NSRB:

- RPI NSRB meeting minutes, dated May 3, 2010
- RPI NSRB Minutes of Meeting, November 24. 2009
- RPI NSRB Minutes of Meeting, May 4, 2009
- RPI NSRB Minutes of Meeting, November 26, 2008

b. Observations and Findings

The TS for the RPI RCF required semiannual meetings of the NSRB. The inspector reviewed the minutes for the last two years and found them compliant with the TS requirements. The TS requires a minimum of two regularly scheduled meetings a year, one at the RPI campus and the other at the RPI Critical Facility.

The TS requires an annual assessment of reactor operations. This assessment of reactor operations was conducted by the RSO on reactor equipment; criticality detectors, area monitors particulate activity detectors, portable detectors and event contact lists Additionally, the audit covered surveillance items, rod timing, moderator dump time, instrument channel calibration, reactor parameters, radiation detectors, contamination inspection and material reports and provide advice to the Facility Director. The RSO proceeded to briefly stipulate the NSRB composition, a brief set of rules, and descriptions of the review and audit functions. The review function included new tests and experiments of a significant difference, reportable occurrences and TS changes. The inspector noted that the RSO additionally performed quarterly reviews at the RCF.

c. Conclusion

NSRB review and audit functions required by the TS were being acceptably implemented and documented.

3. Radiation Protection Program

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with 10 CFR Parts 19 and Part 20 and TS Sections 3.3 and 5.5:

- Calibration Certificate for RCF Portable Monitor (Ludlum Model 3-330R), dated May 15, 2010
- Personnel and environmental dosimetry results for 2009 and 2010
- Rensselaer Radiation Safety Manual, dated December 2008
- Occupational Radiation Exposure Report results 2009 to June 15, 2010
- Completed Quarterly Radiation Safety Audits, Radioactive Materials Lab for the RCF, dated November 5, 2008 - July 12, 2010
- RCF Quarterly Surveillances, completed forms from January 2008 to July 2010
- Radiation Safety Training Presentation for Radiation Workers, undated
- Radiation Safety Annual Report – 2008 and 2009
- RCF and Public Safety personnel training records
- Sealed Source Inventory and Survey - RCF Source completed forms from 2008 to July 2010

b. Observations and Findings

The RSO applies the radiation protection program uniformly to the two licensed activities on campus (broad scope and the reactor). The licensee's program for radiological health and safety related to the reactor license was evaluated during this inspection.

(1) Surveys

The inspector reviewed quarterly radiation and contamination surveys of the licensee's controlled areas as well as radiation wipe surveys completed by the RSO. The surveys had been completed in accordance with the applicable procedure. The results were documented on the appropriate forms, evaluated as required and corrective actions taken when readings or results exceeded set action levels. The survey also included a checklist of items to be verified such as the adequacy of warning signs and postings in the area and training for radioactive material users. The number and location of survey points was adequate to characterize the radiological conditions. Surveys by the RSO were conducted in accordance with the appropriate procedure and logged on the appropriate forms.

(2) Postings and Notices

The inspector reviewed the postings at the entrances to various controlled areas including the Reactor Bay, and radioactive material storage areas. The postings were acceptable and indicated the radiation and contamination hazards present. The facility's radioactive material storage areas were noted to be properly posted. No unmarked radioactive material was found in the facility. A copy of current notices to workers required by 10 CFR Part 19 was posted at the entrance to the Reactor Cell as well as numerous areas in the RCF.

(3) Dosimetry

The licensee used a National Voluntary Laboratory Accreditation Program-accredited vendor, to process personnel dosimetry. Through direct observation, the inspector determined that dosimetry was used in an acceptable manner by facility personnel. For visitors to the facility, a whole body film badge dosimeter is generally issued to each individual. Records indicate that no abnormal readings were obtained.

An examination of the records for the inspection period showed that all exposures were well within NRC limits and within licensee action levels. There are currently eight people at the RCF that are being monitored by thermoluminescence dosimeter (TLDs). All of the personnel associated with the facility received an annual deep dose exposure less than 10 millirem (mrem) for 2009. Current exposure records for 2010 indicate no increased levels in exposures. The licensee investigates any dosimetry readings that indicate an exposure above background levels.

(4) Radiation Monitoring Equipment

The calibration of portable survey meters and friskers was typically completed by a company that specializes in calibrations while fixed radiation detectors were calibrated at the facility using a portable source. The calibration records of portable survey meters and fixed radiation detectors in use at the facility were reviewed. Calibration frequency met the requirements established in the applicable procedures while records were being maintained as required. The inspector observed that proper precautions are always used to maintain doses for calibrations as low as reasonably achievable.

(5) Radiation Protection Program

The inspector verified that the radiation protection program was being reviewed annually as required. No issues related to the radiation protection program at the RCF were identified in the review of the program.

RPI requires that all personnel who work with radioactive materials receive training in radiation protection, policies, procedures, requirements, and the facilities prior to having unescorted access to the RCF. The RSO is responsible for conducting the training and all of the training is typically conducted online. The RSO typically also conducts annual refresher training in a classroom setting. The inspector reviewed the training covered the topics required to be taught in 10 CFR Part 19 and the review of training materials indicated that the staff, faculty and students were instructed on the appropriate subjects.

(6) Facility Tours

The inspector toured the RCF and the accompanying facilities. Control of radioactive material and control of access to radiation and high radiation areas were acceptable. The postings and signs for these areas were appropriate.

(7) Environmental Monitoring

The licensee ensures compliance with NRC regulations for environmental monitoring by ensuring that all doses at the site boundary are less than the dose limits specified in 10 CFR 20.1301. Several TLDs are strategically placed in several locations around the perimeter of the RCF. Records for 2009 indicate that doses were well below the applicable requirements and typically measure at background levels. Current exposure records for 2010 indicate no increased levels in exposures. In addition to the measurements at the site boundary, radiation surveys of the reactor facility show that doses are less then the regulatory limit for environmental exposure rates. Environmental monitor reports for 2008 and 2009 (exclusion are and site boundary) recorded < 40 mrem above background.

Records show that projected gaseous emissions from the reactor are generally minimal. The licensee uses a calculation provided in the Safety Evaluation Report from the RCF license renewal in 1983 to project a maximum annual release from the RCF and reduces the value by the ratio of actual versus projected usage of the reactor. The licensee uses this value as input to the Environmental Protection Agency computational code “COMPLY,” which shows that the licensee is in compliance with 10 CFR 20.1301(a)(1).

The licensee reported no liquid discharges or releases performed since 2005.

c. Conclusion

The inspector determines that : (1) surveys were being completed and documented acceptably to permit evaluation of the radiation hazards present, (2) postings met the regulatory requirements specified in 10 CFR Part 19, (3) personnel dosimetry was being worn as required and doses were well within the licensee’s procedural action levels and NRC’s regulatory limits, (4) radiation monitoring equipment was being maintained and calibrated as required, (5) the Radiation Protection Program being implemented by the licensee satisfied regulatory requirements, and (6) effluent monitoring satisfied license and regulatory requirements and releases were within the specified regulatory and TS limits.

4. Emergency Preparedness

a. Scope (IP 69001)

The inspector reviewed selected aspects of:

- Emergency Plan for the RPI Critical Experiment Facility (E-Plan), dated August 2004
- RCFRM Chapter 6: Emergency Procedures, dated November 2002
- RCFRM Chapter 8: Notification Procedure, dated May 1, 1985
- RCF Emergency Notification List, dated 2010
- First Aid Kit Contents and Annual Inventory Checks List
- Schedule of Periodic Requirements, version dated July 14, 2005
- Memoranda of Agreement (MOA) with support agencies
- Annual emergency drills held 2008, 2009 and 2010
- emergency response facilities, supplies, equipment and instrumentation
- RPI RCF Log Books for the period August 30, 2008 - present

b. Observations and Findings

The inspector reviewed the E-Plan in use at the RCF and verified that the E-Plan was being properly implemented at the facility. The inspector reviewed the emergency facilities, instrumentation, and equipment and verified that the off-site emergency response equipment was as described in the E-Plan. The inspector verified that MOA had been established with the Ellis Hospital, City of Schenectady Police Department and Fire Department, and Mohawk Ambulance Service.

Through direct observation, records review, and interviews with emergency organization personnel, the inspector determined that they were capable to respond, and knowledgeable of the proper actions to take in case of an emergency. The RCF staff is responsible for responding to an emergency during all hours and making initial assessment and corrective and protective actions. The responsibility and authority for directing and coordinating emergency response activities are assigned to the fire department, acting as the emergency director. All RCF staff receives annual emergency response training. The inspector verified that the licensee reviewed the E-Plan on an annual basis, the E-Procedures on a biennial basis, conducted an inventory of the first aid kit annually, and checked the emergency siren annually.

Emergency evacuation drills had been conducted annually as required by the E-Plan. The drill for 2008 and 2009 were both practical exercises and effectively tested the notification of emergency personnel. Critiques were written and discussed following the drills to document any problems identified during the exercises. The licensee has conducted orientation tours for the RPI Department of Public Safety and the Schenectady Fire Department.

c. Conclusion

The emergency preparedness program was conducted in accordance with the requirements stipulated in the E-Plan.

5. Transportation of Radioactive Materials

a. Inspection Scope (IP 86740)

The inspector reviewed selected aspects of:

- radioactive materials shipping procedures
- interviewed staff

b. Observations and Findings

No radioactive material was transferred from or to the reactor since the last inspection. If required, material would be passed to the university license and then packaged and shipped by Environmental Health and Safety personnel under the state license.

c. Conclusion

No radioactive material was transferred from or to the reactor since the last inspection.

6. Exit Interview

The inspection scope and results were summarized on August 5, 2010, with the Facility Director and Staff. The inspector discussed the findings for each area reviewed. The licensee acknowledged the findings and did not identify as proprietary any of the material provided to or reviewed by the inspector during the inspection and the results of the inspection are subject to management review.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

P. Caracappa	Radiation Safety Officer
J. Thompson	Operations Supervisor
P.Caracappa	Radiation Safety Officer
M. Del-Vecchio	Sergeant, Department of Public Safety
T.Trumbull	Reactor Critical Facility Director

INSPECTION PROCEDURES USED

IP 69001	Class II Non-Power Reactors

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

None

LIST OF ACRONYMS USED

10 CFR	Title 10 of the *Code of Federal Regulations*
ADAMS	Agencywide Document Access and Management System
E-Plan	Emergency Plan
IP	Inspection Procedure
MANE	Mechanical, Aerospace and Nuclear Engineering
Mrem	Millrem
MOA	Memorandum of Agreement
NSRB	Nuclear Safety Review Board
NRC	Nuclear Regulatory Commission
RCF	Reactor Critical Facility
RPI	Rensselaer Polytechnic Institute
RSO	Radiation Safety Officer
SRO	Senior Reactor Operator
TLD	Thermoluminescence Dosimeter
TS	Technical Specification